

WHAT IS CLAIMED IS:

I. A system for three-dimensional viewing of a display, the display presents a frame, the frame includes first subregions and second subregions distributed across and along the frame, the first subregions alternately present first and second picture elements of a left image and a right image, respectively, while at the same times, the second subregions alternately present corresponding second and corresponding first picture elements of the right image and the left image, respectively, the system comprising:

- (a) a layer of shutter means including alternating first and second subareas being arranged across and along said layer, wherein in a first phase of operation, said first subareas are substantially opaque and said second subareas are substantially transparent, whereas in a second phase of operation said first subareas are substantially transparent and said second subareas are substantially opaque, said layer of shutter means being in a distance from the display and said first and second subareas being distributed across and along said layer of shutter means, such that in said first phase of operation, light emanating from the first subregions reaches the one of the eyes of the viewer and is substantially blocked from the other eye and light emanating from the second subregions reaches the other eye of the viewer and is substantially blocked from the first eye, whereas in said second phase of operation, light emanating from the first subregions reaches the other eye of the viewer and is substantially blocked from the first eye and light emanating from the second subregions reaches the first eye of the viewer and is substantially blocked from the other eye; and
- (b) a coordinating element coordinating between rates of selecting said first and second phases of operation and between alternately presenting the first and second picture elements of the left and right images in the first and second subregions, such that when said first phase of operation is

09987793 "111601

selected, the first picture elements are presented in the first subregions and the second picture elements are presented in the second regions, whereas when said second phase of operation is selected, the second picture elements are presented in the first subregions and the first picture elements are presented in the second regions.

2. A system for three-dimensional viewing as in claim 1, wherein said layer of shutter means includes a first and a second light polarizing sublayers both polarize light, and a sublayer of alternating first and second on and off switchable light rotating means located between said first and second light polarizing sublayers, said first and second switchable light rotating means are under control of said coordinating element, such that when said first switchable light rotating means are on said second switchable light rotating means are off, and when said first switchable light rotating means are off said second switchable light rotating means are on.

3. A system for three-dimensional viewing as in claim 1, wherein said layer of shutter means includes a first and a second light polarizing sublayers and a sublayer of multiple on and off switchable light rotating means located between said first and a second light polarizing sublayers, the system further comprising a multi-line controlling switching means, each of said multiple switchable light rotating means of each of said sublayer of multiple on and off switchable light rotating means being individually switched on and off by said multi-line controlling switching means, such that size and position of said first and second subareas is under control of said multi-line controlling switching means, such that the system is adjustable for accommodating various positions and distances of the viewer from the display.

4. A system for three-dimensional viewing as in claim 1, further comprising mechanical means for translating said layer of shutter means relative to the display.

5. A system for three-dimensional viewing as in claim 3, further comprising additional layers of shutter means being between the display and a viewer and being controlled by said multi-line controlling switching means.

6. A system for three-dimensional viewing as in claim 3, further comprising means for sensing said position and said distance of the viewer relative to the display.

7. A system for three-dimensional viewing of a display, the system comprising:

- (a) a display operable to present picture elements of a left image in first subregions of selected size and position on said display, and to present picture elements of a right image in second subregions of selected size and position on said display;
- (b) at least one layer of shutter means including a first and a second light polarizing sublayers and a sublayer of multiple on and off switchable light rotating elements located between said first and said second light polarizing sublayers;
- (c) a multi-line controlling switching means, each of said multiple switchable light rotating means of each of said sublayer of multiple on and off switchable light rotating means being individually switched on and off by said multi-line controlling switching means;
- (c) a computing element operable to utilize said multi-line controlling switching means to switch on and off said switchable light rotating elements so as to establish within said layer of shutter means first subareas substantially transparent to passage of light and second

85

subareas substantially opaque to passage of light, said first and said second subareas being distributed across and along said layer of shutter means in such a manner that light emanating from said first subregions reaches the left eye of a viewer and is substantially blocked from the viewer's right eye, and light emanating from said second subregions reaches the right eye of the viewer and is substantially blocked from the viewer's left eye;

wherein, the system being adjustable to varying positions and distances of the eyes of a viewer relative to said display, so as to maintain three-dimensional vision.

8. The system of claim 7, further comprising an eye-locating unit for sensing said position and said distance of the eyes of a viewer relative to said display.

9. The system of claim 8, wherein information provided by said eye-locating unit is utilized by said computing element to compute positions at which to establish said first subareas and said second subareas within said layer of shutter means.

10. The system of claim 8, wherein information provided by said eye-locating unit is utilized by said computing element to select first portions of said display as said first subregions, and to select second portions of said display as said second subregions.

11. The system of claim 8, wherein information provided by said eye-locating unit is utilized by said computing element to select first portions of said display as said first subregions and to select second portions of said display as said second subregions, and wherein said information provided by said eye-locating unit is further utilized by said computing element to compute

09987793 "11601
T0911T" E62860

positions at which to establish said first subareas and said second subareas within said layer of shutter means.

12. The system of claim 8, wherein said eye-locating unit comprises a camera.

13. The system of claim 7, further comprising a plurality of layers of shutter means.

14. A system for providing to a viewer stereoscopic viewing of a left image and a right image, comprising:

- (a) a display operable to present a frame which includes at any given time first subregions and second subregions distributed across and along said frame, said first subregions being of selected size and position and presenting picture elements of a left image, said second subregions being of selected size and position and presenting picture elements of a right image;
- (b) an eye-locating module operable to determine and report eye positions of said viewer with respect to said display;
- (c) at least one optical layer interposed between said viewer and said display, said optical layer comprises multiple individually switchable light rotating elements, each of said elements being operable in a first mode of operation to substantially prevent passage of light through a portion of said layer, and operable in a second mode of operation to substantially permit passage of light through said portion of said layer;
- (d) a control module operable to switch selected ones of said switchable light rotating elements to said first mode of operation and to switch selected others of said switchable light rotating elements to said second mode of operation; and

09987793 "111601
T0911T E01601

87

- (e) a calculation module operable to utilize information provided by said eye-locating module to coordinate sizes and positions of said first and second subregions with selection of ones of said light-rotating elements to be in said first mode of operation and of others of said light-rotating elements to be in said second mode of operation, such that light from said first subregions reaches substantially only the left eye of a viewer and light from said second subregions reaches substantially only the right eye of a viewer, the system being adaptable to varying positions of the viewer's eyes.

15. The system of claim 14, wherein said first subregions and said second subregions are of fixed size, the system accommodating to lateral movement of a viewer.

16. A system for three-dimensional viewing of a display, the display presents a frame, the frame includes first subregions and second subregions distributed across and along the frame, the first subregions present picture elements of a left image while at the same time the second subregions present picture elements of a right image, the system comprising:

- (b) at least one layer of shutter means including a first and a second light polarizing sublayers and a sublayer of multiple on and off switchable light rotating elements located between said first and said second light polarizing sublayers;
- (c) a multi-line controlling switching means, each of said multiple switchable light rotating means of each of said sublayer of multiple on and off switchable light rotating means being individually switched on and off by said multi-line controlling switching means; and
- (c) a computing element operable to utilize said multi-line controlling switching means to establish within said layer of shutter means first subareas substantially transparent to passage of light and second

88

subareas substantially opaque to passage of light, said first and said second subareas being distributed across and along said layer of shutter means in such a manner that light emanating from the first subregions of the display reaches the left eye of a viewer and is substantially blocked from the viewer's right eye, and light emanating from the second subregions of the display reaches the right eye of the viewer and is substantially blocked from the viewer's left eye;

wherein, the system being adjustable to varying positions and distances of the viewer from said display, so as to maintain three-dimensional vision..

17. The system of claim 16, wherein said layer of shutter means includes a first and a second light polarizing sublayers and a sublayer of multiple on and off switchable light rotating means located between said first and a second light polarizing sublayers, the system further comprising a multi-line controlling switching means, each of said multiple switchable light rotating means of each of said sublayer of multiple on and off switchable light rotating means being individually switched on and off by said multi-line controlling switching means, such that size and position of said first and second subareas is under control of said multi-line controlling switching means, such that the system is adjustable for accommodating various positions and distances of the viewer from the display.

18. The system of claim 16, further comprising mechanical means for translating said layer of shutter means relative to the display.

19. The system of claim 17, further comprising additional layers of shutter means being between the display and a viewer and being controlled by said multi-line controlling switching means.

09987793 "111504

20. The system of claim 17, further comprising means for sensing said position and said distance of the viewer relative to the display.

21. A method for showing stereoscopic three-dimensional images to a viewer, comprising:

- (a) utilizing eye-locating apparatus for determining positions of eyes of a viewer with respect to a display;
- (b) utilizing computing means to select, based on information provided by said eye-locating apparatus, first subregions of a display for display of picture elements of a left image and second subregions of a display for display of picture elements of a right image, and further utilizing said computing means to select, on an optical layer positioned between said viewer and said display, first subareas of said optical layer to be in a first mode of operation wherein said first subareas are substantially opaque, and second subareas of said optical layer to be in a second mode of operation wherein said second subareas are substantially transparent,
- (b) displaying picture elements of a left image on said first subregions of said display and displaying picture elements of a right image on said second subregions of said display; and
- (c) utilizing multi-line controlling switching means controlling multiple switchable light rotating means included in said optical layer to switch said selected first subareas of said optical layer to said first mode of operation, thereby rendering said selected first subareas substantially opaque, and utilizing said multi-line controlling switching means to switch said selected second subareas of said optical layer to said second mode of operation, thereby rendering said selected second subareas substantially transparent;

thereby creating an optical configuration such that light from said first subregions of said display can be seen by a left eye of said viewer but is substantially blocked from being seen by a right eye of said viewer, and light

0993793 "111601

90

from said second subregions of said display can be seen by a right eye of said viewer but is substantially blocked from being seen by a left eye of said viewer, thereby providing to said viewer a stereoscopic view of left and right images.

FOFF" E542550